

5

**A SYSTEM AND METHOD FOR
MULTI-STAGE PREDICTIVE MOTION ESTIMATION**

10

ABSTRACT OF THE INVENTION

A “predictive motion estimator” operates by conducting one or more stages of a multi-stage motion vector (MV) search. A first stage involves performing a background detection process for determining possible MVs. In a
15 second stage, candidate MVs are determined in spatial and temporal neighborhoods. Finally, in a third stage, candidate MVs are determined through MV refinement or pattern searching. Reliability of motion estimation results is evaluated at each stage for determining whether to proceed to the next stage. By gradually enlarging the search pool and advancing the search to the next
20 stage only when the reliability of current stage results are unsatisfactory, the predictive motion estimator successfully balances motion vector search complexity and reliability of motion estimation. Further, for ensuring flexibility in adapting to video sequences of various characteristics, the predictive motion estimator derives search parameters for each stage from prior stage motion
25 estimation results, rather than using preset parameters.